

15894/US Hz

PATENT CLAIMS (preliminary amendment)

- 5 1. A method for operating a magnetic logic device, wherein  
at least one output variable  $O = F(I_A, I_B)$  is formed by  
at least one logic operation from input variables  $I_A, I_B$   
with an operator function  $F$  of the magnetic logic  
device, comprising the steps of:
- 10 - selecting an operator control signal SET from a group  
of control signals with which various non-volatile  
starting states can be set in a controlled manner, each  
signal being characteristic of a different logic  
function,
- 15 - setting the starting state of the magnetic logic  
device for executing the operator function  $F$  with the  
selected operator control signal SET, wherein the  
magnetic logic device includes one signal magnetic  
element with two magnetic setting elements which are set  
20 with the operator control signal SET, and subsequently  
- executing the operation with the magnetic logic  
device.
2. The method according to Claim 1, in which starting  
25 states can be set with the control signals, each state  
being characteristic of a logic function from the group  
of logic AND, OR, NAND and NOR functions.
3. The method according to Claim 1, wherein starting states  
30 can be set with the control signals, each state being  
characteristic of a logic function from the group of  
logic AND and OR functions or logic NAND and NOR  
functions.
- 35 4. The method according to claim 1, wherein the control  
signals are control current signals under the influence  
of which magnetic fields are generated or they include  
switching signals under the influence of which

remagnetization occurs, wherein the respective logic function is set in the logic device by the magnetic fields or the remagnetization.

- 5    5.    The method according to Claim 4, wherein the control current signals are sent via input lines to the input of the input variables  $I_A$ ,  $I_B$  into the logic device.
6.    The method according to Claim 4, wherein the control current signals have constant current values.
- 10    7.    The method according to Claim 4, wherein the control current signals include switched-mode currents.
- 15    8.    The method according to claim 1, wherein the logic device receives input current signals for input of the logic input variables  $I_A$ ,  $I_B$ .
9.    The method according to Claim 8, wherein the input current signals and the control current signals have the same values.
- 20    9.    The method according to Claim 8, wherein the input current signals and the control current signals have the same values.
10.   The method according to claim 1, wherein the magnetic logic device has at least one magnetic element with at least two magnetic setting elements, which are set with the operator control signal SET for executing the operator function F.
- 25    10.   The method according to claim 1, wherein the magnetic logic device has at least one magnetic element with at least two magnetic setting elements, which are set with the operator control signal SET for executing the operator function F.
11.   The method according to Claim 10, wherein the magnetic element has two magnetic setting elements, whereby the coercitive field strengths and the current values of the input current signals are coordinated so that both setting elements can be set by the operator control signal.
- 30    11.   The method according to Claim 10, wherein the magnetic element has two magnetic setting elements, whereby the coercitive field strengths and the current values of the input current signals are coordinated so that both setting elements can be set by the operator control signal.
12.   The method according to Claim 10, wherein the magnetic element has two magnetic setting elements, whereby the coercitive field strength of one of the setting elements
- 35    12.   The method according to Claim 10, wherein the magnetic element has two magnetic setting elements, whereby the coercitive field strength of one of the setting elements

is selected to be so high that it cannot be changed with the input current signals.

13. The method for operating a magnetic logic circuit,  
5 comprising a plurality of logic devices with which a plurality of logic operations may be executed either simultaneously or in succession according to a method as characterized in claim 1.
- 10 14. The method according to Claim 13, wherein each logic device executes the same or different logic operations in succession.
- 15 15. A logic device having at least two inputs and at least one output, whereby the logic device is provided with at least one logic operation for execution, wherein at least one output variable  $O = F(I_A, I_B)$  is formed from input variables  $I_A, I_B$  with an operator function  $F$ , wherein:
  - 20 - the logic device is connected to a control circuit, which is equipped for providing an operator control signal that is selected from a group of control signals with which various non-volatile starting states of the logic device that are characteristic of various logic
  - 25 functions can be set, and for setting the logic device at a starting state corresponding to the operator control signal, and
  - 30 - the logic device comprises one single magnetic element having two magnetic setting elements which are set with the operator control signal SET for execution of the operator function  $F$ .
- 35 16. The logic device according to Claim 15, wherein the control circuit has a current source and a switching device with which the magnetoresistive element can receive the operator control signal.

17. The logic device according to Claim 15, wherein the control circuit has an operator function selector with which the operator control signal is selectable.
- 5 18. The logic device according to Claim 15, wherein the magnetic element includes a magnetoresistive element.
19. A logic circuit having a plurality of logic devices according to Claim 15.
- 10 20. The logic circuit according to Claim 19, wherein each logic device is connected to a separate control circuit.
- 15 21. The logic circuit according to Claim 19, wherein the logic devices are connected in groups or collectively to a common control circuit.